

Name: _____

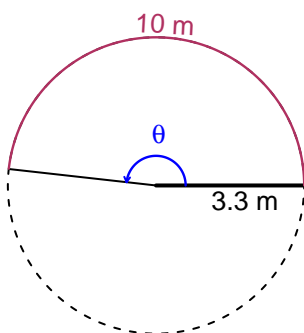
Date: _____

Trig Final (Solution v19)

- You should have a calculator (like [Desmos](#)) and a [unit-circle](#) reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The radius is 3.3 meters. The arc length is 10 meters. What is the angle measure in radians?

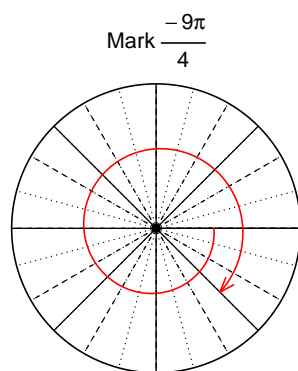


$$\theta = \frac{L}{r} \quad r = \frac{L}{\theta} \quad L = r\theta$$

$\theta = 3.03$ radians.

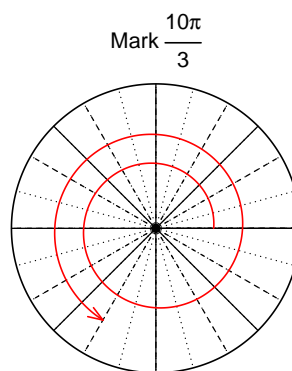
Question 2

Consider angles $-\frac{9\pi}{4}$ and $\frac{10\pi}{3}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(-\frac{9\pi}{4}\right)$ and $\cos\left(\frac{10\pi}{3}\right)$ by using a unit circle (provided separately).



Find $\sin(-9\pi/4)$

$$\sin(-9\pi/4) = \frac{-\sqrt{2}}{2}$$



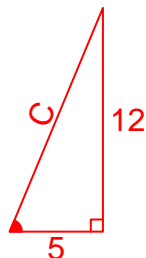
Find $\cos(10\pi/3)$

$$\cos(10\pi/3) = \frac{-1}{2}$$

Question 3

If $\tan(\theta) = \frac{-12}{5}$, and θ is in quadrant II, determine an exact value for $\cos(\theta)$.

Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



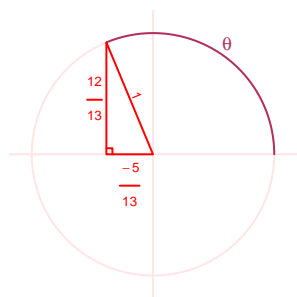
Solve the Pythagorean Equation

$$5^2 + 12^2 = C^2$$

$$C = \sqrt{5^2 + 12^2}$$

$$C = 13$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant II in a unit circle.



$$\cos(\theta) = \frac{-5}{13}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = 5.97$ meters, an amplitude of 8.33 meters, and a frequency of 4.78 Hz. At $t = 0$, the mass is at the minimum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -8.33 \cos(2\pi 4.78t) + 5.97$$

or

$$y = -8.33 \cos(9.56\pi t) + 5.97$$

or

$$y = -8.33 \cos(30.03t) + 5.97$$